CLAIMS:

1. An apparatus for varying the path length of a beam of radiation, the apparatus comprising:

an element rotatably mounted about an axis, said element comprising two reflective surfaces in fixed relation to one another such that radiation may be reflected between said reflective surfaces and out of the element; and

driving means for rotatably oscillating said element about said axis.

2. An apparatus according to claim 1, wherein said driving means comprises a galvanometer.

3. An apparatus according to claim 2, wherein said driving means is configured to vary the speed of the element during each oscillation such that the path length is varied linearly with time.

4. An apparatus according to any preceding claim, wherein said driving means is configured to oscillate said element through an angle of at most 40°.

5. An apparatus according to any preceding claim, wherein said element comprises a solid optic and said reflective surfaces are provided by surfaces of said optic.

6. An apparatus according to claim 5, wherein the said reflective surfaces are metallised.

7. An apparatus according to either of claims 5 or 6, wherein said solid optic is a rhomboid prism and said surfaces are two facing surfaces of said rhomboid.

8. An apparatus according to any of claims 5 to 7, wherein the solid optic comprises a material having a higher refractive index than 1.

9. An apparatus according to claim 8, wherein the solid optic has a refractive index of at least 1.2.

10. An apparatus according to any preceding claim, further comprising a reflecting member configured to reflect radiation exiting the element back into the element, the reflecting member being configured such that radiation reflected back into the element exits the element along a fixed final exit path regardless of the rotational position of the element.

11. An apparatus according to claim 10, wherein radiation which enters the element for a first time follows a first path and the reflecting member is configured to reflect radiation back into the element such that the radiation reflected by the reflecting member follows the first path in reverse.

12. An apparatus according to claim 11, wherein said reflecting member is provided with polarisation translation means.

13. An apparatus according to claim 10, wherein radiation which enters the element for a first time follows a first path and the reflecting member is configured to reflect radiation back into the element such that the reflected radiation follows a second path, said second path being said first path reversed and displaced along said rotation axis.

14. An apparatus according to any of claims 10 to 13, wherein said reflecting member is a first reflecting member and the apparatus further comprises a second reflecting member, said first and second reflecting members being configured such that radiation may be reflected back through said element at least four times.

15. A method for varying the path length of a beam of radiation, the method comprising:

providing an element comprising two reflective surfaces in fixed relation to one another such that radiation may be reflected between said reflective surfaces and out of the element;

rotatably mounting said element about an axis; and

rotatably oscillating said element about said axis.

16. A system for investigating a sample, the system comprising:

an emitter for emitting radiation to irradiate said sample;

a detector for detecting radiation reflected from or transmitted by said sample, radiation travelling from the emitter to the detector following a first path;

means for supplying radiation along a second path to said detector and having a phase related to that of the radiation leaving the emitter,

the system further comprising an apparatus according to any of claims 1 to 14, provided within either of the first or second paths.

17. An apparatus as substantially hereinbefore described with reference to any of the accompanying figures.

18. A system as substantially hereinbefore described with reference to any of the accompanying figures.

19. A method as substantially hereinbefore described with reference to any of the accompanying figures.